



IB/04/01130

Sertifikaat

REPUBLIEK VAN SUID-AFRIKA

PATENT KANTOOR
DEPARTEMENT VAN HANDEL
EN NYWERHEID

Certificate

REPUBLIC OF SOUTH AFRICA

PATENT OFFICE
DEPARTMENT OF TRADE AND
INDUSTRY

Hiermee word gesertifiseer dat
This is to certify that

the documents annexed hereto are true copies of:

Application forms P.1 and P.2, provisional specification and drawings of
South African Patent Application No. 2002/8246 as originally filed in the
Republic of South Africa on 14 October 2002 and postdated to 14 April
2003 in the name of THE BÜHRMANN TRUST for an invention
entitled: "APPARATUS FOR THE ADVANCE OF AN OSCILLATING MEMBER
ALONG A RAIL".

**PRIORITY
DOCUMENT**

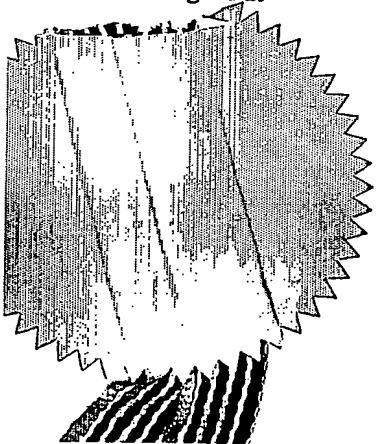
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Geteken te
Signed at **PRETORIA**

in die Republiek van Suid-Afrika, hierdie
in the Republic of South Africa, this

3th dag van
day of May 2004

Registrar of Patents



REPUBLIC OF SOUTH AFRICA

Form P.2

REGISTER OF PATENTS

PATENTS ACT, 1978

OFFICIAL APPLICATION NO.		LODGING DATE : PROVISIONAL		ACCEPTANCE DATE			
21	01. 2002/8246	22. 14 October 2002 14. 11. 2003		43			
INTERNATIONAL CLASSIFICATION		LODGING DATE : COMPLETE		GRANTED DATE			
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FULL NAME(S) OF APPLICANT(S) / PATENTEE(S)							
71	THE BÜHRMANN TRUST						
APPLICANTS SUBSTITUTED :							
71					DATE REGISTERED		
ASSIGNEE(S)							
71					DATE REGISTERED		
FULL NAME(S) OF INVENTOR(S)							
72	BÜHRMANN, Rudolph						
PRIORITY CLAIMED		COUNTRY		NUMBER		DATE	
N.B. Use international abbreviation for country. (See Schedule 4)		33		31		32	
TITLE OF INVENTION							
54	APPARATUS FOR THE ADVANCE OF AN OSCILLATING MEMBER ALONG A RAIL						
ADDRESS OF APPLICANT(S) / PATENTEE(S)							
64 SECOND STREET LINDEN JOHANNESBURG GAUTENG PROVINCE South Africa							
ADDRESS FOR SERVICE							
74	John & Kernick, PO Box 3511, Halfway House, Republic of South Africa					REF	
PATENT OF ADDITION NO.						DATE OF ANY CHANGE	
61							
FRESH APPLICATION BASED ON						DATE OF ANY CHANGE	

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978

REPUBLIC OF SOUTH AFRICA
REVENUE

Form P.1

APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT
(Section 30 (1) - Regulation 22)

The grant of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate.

OFFICIAL APPLICATION NO

21 01 **2002/8246**

AGENT'S REFERENCE

P15281ZA00

FULL NAME(S) OF APPLICANT(S)

THE BÜHRMANN TRUST

ADDRESS(ES) OF APPLICANT(S)

64 SECOND STREET
LINDEN
JOHANNESBURG
GAUTENG PROVINCE
South Africa

TITLE OF INVENTION

APPARATUS FOR THE ADVANCE OF AN OSCILLATING MEMBER ALONG A RAIL

THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P2
The earliest priority claimed is

THIS APPLICATION IS FOR A PATENT OF
ADDITION TO PATENT APPLICATION NO.

21 01

THIS APPLICATION IS FRESH APPLICATION IN TERMS
OF SECTION 37 AND BASED ON APPLICATION NO.

21 01

THIS APPLICATION IS ACCOMPANIED BY :

- | | | |
|---|-----|--|
| X | 1a | A single copy of a provisional specification of 8 pages. |
| | 1b | Two copies of a complete specification of pages. |
| | 2a | Informal drawings of sheets. |
| X | 2b | Formal drawings of 2 sheets. |
| | 3 | Publication particulars and abstract (form P8 in duplicate). |
| | 4 | A copy of figure of the drawings for the abstract. |
| | 5 | Assignment of invention (from the inventors) or other evidence of title. |
| | 6 | Certified priority document(s). |
| | 7 | Translation of priority document(s). |
| | 8 | Assignment of priority rights. |
| | 9 | A copy of form P2 and a specification of S.A. Patent Application. |
| | 10 | A declaration and power of attorney on form P3. |
| | 11 | Request for ante-dating on form P4. |
| | 12 | Request for classification on form P9. |
| | 13a | Request for delay of acceptance on form P4. |
| | 13b | |

21 01

DATED 14 October 2002

ADDRESS FOR SERVICE

John & Kernick
P.O.Box 3511
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Patent Attorney for Applicant

RECEIVED

OFFICIAL DATE STAMP

REGISTRAR OF PATENTS

REGISTRAR OF PATENTS DESIGNS
TRADE MARKS AND COPYRIGHT

2002-10-14
2002-10-14
2003-10-14
REGISTRAR VAN PATENTE, MODELLE
HANDELSMERKE EN OUTERSKEI

The duplicate will be returned to the applicant's address for service as proof of lodging but is not valid unless endorsed with official stamp.

REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978

PROVISIONAL SPECIFICATION
(Section 30 (1) - Regulation 27)

OFFICIAL APPLICATION NO.		LODGING DATE		AGENT'S REFERENCE	
21	01.2002/8246	22	14 October 2002 14 Feb 2003	P15281ZA00	
FULL NAME(S) OF APPLICANT(S)					
71	THE BÜHRMANN TRUST				
FULL NAME(S) OF INVENTOR(S)					
72	BÜHRMANN, Rudolph				
TITLE OF INVENTION					
54	APPARATUS FOR THE ADVANCE OF AN OSCILLATING MEMBER ALONG A RAIL				

**APPARATUS FOR THE ADVANCE OF AN OSCILLATING
MEMBER ALONG A RAIL**

FIELD OF THE INVENTION

The invention relates to an apparatus that imparts relative movement between an oscillating member and a rail.

BACKGROUND OF THE INVENTION

It is sometimes required that an oscillating member be moved in a particular direction. Where this is necessary, use is made of separate moving means to advance the member in that direction. This means is usually heavy, cumbersome and costly. An example of such an oscillating member is an underground drill machine that requires thrusting. The thrusting is often effected with a drill leg or rig thrust cylinder.

It may also be favourable to convert the oscillation of such an oscillating member into movement of a separate member.

OBJECT OF THE INVENTION

It is an object of this invention to provide an apparatus that converts the oscillation of an oscillating member into relative movement between the member and a rail.

SUMMARY OF THE INVENTION

In accordance with this invention there is provided an apparatus for the advance of an oscillating member along a rail, comprising a support providing a fulcrum and a biasing means to bias a lever about the fulcrum, the lever having, spaced apart along its length from the fulcrum, an engaging formation whereby a rail is slidably engageable; and the engaging formation configured to selectively grip and release the rail.

Further features of the invention provide for the biasing means to resiliently bias the lever; for the engaging formation to be configured to provide the lever with an over center cross-corner lock fit to a rail; and for the engaging formation to provide a pair of opposite engaging surfaces that are transversely inclined relative to the axis of the lever and locatable on opposite sides of a rail to be offset along the length of the rail; and for the engaging surfaces to be parallel.

Further features of the invention provide for the fulcrum to be resiliently biased toward the lever; and for the fulcrum to be a second biasing means that biases the lever against a second fulcrum provided by the support.

Further features of the invention provide for the fulcrums to be between their respective biasing means and the engaging formation of the lever; and for the biasing means and second biasing means to be piston and cylinder assemblies with the pistons contacting the lever; and for the piston and cylinder assemblies to be hydraulic or pneumatic.

A further feature of the invention provides for there to be cooperating ball and socket bearing formations between the lever and biasing means' and/or fulcrums; and for the engaging formation to be a passage through the lever.

Further features of the invention provide for the support to be a carriage whereon a percussion drill is secured or for the support to be integral with the casing of a drill.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described by example only with reference to the drawings in which:

Figure 1: shows a schematic cross-sectional view of a first embodiment of the invention;

Figure 2: shows a schematic cross-sectional view of a second embodiment of the invention arranged for forward movement; and

Figure 3: shows a similar view of the embodiment of Figure 2 arranged for rearward movement.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Figure 1, an apparatus (2) for the advance of an oscillating member along a rail (4) is shown. The apparatus has a support (6) in the form of a housing. The housing (6) provides a fixed fulcrum (8). A biasing means (10) is located in the housing opposite to the fulcrum. The biasing means (10) has a biasing member (12) with a base (14) at one end and head (16) at the other. It also includes resilient means (not shown) that is located between the base (14) and the wall of the housing in line with the base (14). The resilient means may be a spring of any suitable type.

A lever (18) extends into the housing (6) between the fulcrum (8) and the head (16) of the biasing member (12). The lever is resiliently biased about the fulcrum (8) by the biasing means (10). The head (16) of the biasing member (12) and the fulcrum (8) are offset to be spaced apart along the length of the lever (18). The head (16) of the biasing member (12) forms a ball that cooperates with a socket located on the lever to provide ball and socket bearing communication between these components.

Spaced apart from the free end of the lever (18) is an engaging formation (20) that is slidably engageable to the rail (4). The engaging formation is configured to selectively grip and release the rail (4) and provides the lever (18) with an over center cross-corner lock fit to the rail (4). The engaging formation is a passage extending transversely through the lever (4). The passage (20) has a two pairs of opposite engaging surfaces (22a and b) and (24a and b) that are transversely inclined relative to the axis of the lever. The pairs of engaging surfaces, (22 a and 22b) and (24a and 24b), are respectively locatable against and on opposite sides of the rail (4) to be offset along the length of the rail (4). This engagement provides the cross-corner lock between the lever (18) and the rail (4). The adjacent surfaces (22a and 24a) and (22b and 24b), of each pair of engaging surfaces, that are on the same side of the passage (20) are inclined at an obtuse angle relative to each other providing an apex along the line where they meet.

In use, the housing (6) is secured to a machine driven to have an oscillatory motion (not shown), such as a rock drill. The rail (4) is secured in spaced apart relationship to the footwall of a mining tunnel and in line with the direction in which movement is required. The lever (18) is fitted to the rail (4) by its engaging formation (20) and supports the housing (6) and drill above the rail (4). The assembly provides an over center cross-corner lock for the lever (18) on the rail (4).

When the drill is started, its oscillation is communicated to the housing. The drill is mounted facing in a forward direction (A). As a result of the oscillation of the drill, there is alternating forward (26) and reverse (27) motion of the housing (6). The rearward motion (27) of the housing (6) takes place against the lock of the lever (18) to the rail (4). This motion is in the same direction as the resilient bias of the biasing means (10). Forward motion (26) of the housing (6) causes the lever (18) to react against the bias of the biasing means (10). The resilience of this bias is selected to be overcome by the force of the forward motion (26) of the housing. The lever (18) pivots about the fixed fulcrum (8) against the bias of the biasing means (10). This disengages the lock of the engaging formation (20) and allows the lever (18) to slip along the rail (4) in a forward direction (A). The following rearward motion (27) of the housing once again engages the lock of the engaging formation (20) to prevent

movement along the rail in a rearward direction. In this way the drill advances to the front (26) of the housing (6) along the rail (4).

Referring to Figures 2 and 3, the housing (6) provides a pair of cylinders (30) and (32) with a pair of pistons (34) and (36) slidably located therein, respectively. The lever (18) is substantially the same as that of the first embodiment shown in Figure 1. Seals (38) about the pistons (34) and (36) provide a closed fluid system wherein each of the cylinders (30) and (32) are respectively fed fluid under pressure through a pair of lines (40) and (42) from a source line (44). The line (40) has a control valve (46). The pistons (34) and (36) both have bodies which terminate in heads similar to that of the first embodiment.

The first piston (34) and cylinder (30) assembly are of greater diameter than the second piston (36) and cylinder (32) assembly and provide the biasing means (10) in Figure 2. The greater diameter of the first piston (34) and cylinder (30) assembly provides a force exerted on the first piston (34) that is greater than the force exerted on the second piston (36). Accordingly, the force exerted on the second piston (36) is overcome by that exerted on the first piston (34) and the second piston (36) is biased into its cylinder to provide a fixed fulcrum (8).

The mechanism of advance is the same as that of the first embodiment described with reference to Figure 1.

It will be appreciated that the advance of the drill is dependant on the penetration of rock by the drill steel. The lever (18) will not slip forwardly along the rail (4) when the drill steel hits a patch of hard rock that is not immediately penetrated and the reaction will be absorbed by the piston and cylinder assemblies within the housing.

In Figure 3, the control valve (46) is used to reduce the pressure in the cylinder of the first piston (34) and cylinder (30) assembly. The first piston (34) is biased into its cylinder (30). The second piston (36) and cylinder (32) now operates as a second biasing means (48). The second biasing means (48) biases the lever (18) in the opposite direction about a second fixed fulcrum (50) provided by the housing (6).

This engages the other pair of engaging surfaces (24a and 24b) to provide the over center cross-corner lock. The biasing means (48) and fixed fulcrum (50) are now on opposite sides of the lever (18) to those shown in Figure 2. It will be appreciated that the same mechanism of advance will now result in the reverse movement of the housing (6) and the drill along the rail (4) in the direction (B).

By controlling the pressure in the cylinder (30) of the first biasing means (10), the forces exerted on the first and second pistons (34) and (36) can be brought to equilibrium so that the lever (18) is held substantially upright. When this is done, there is no cross-corner grip to the rail (4). The housing (6) and drill will then oscillate without any forward or rearward advance.

The mechanism is based on a friction drive on a rail provided by applying force to an over center cross-corner locking lever in one direction at a sufficiently far enough distance from the rail to produce a friction lock on the rail and then applying force in the return direction sufficiently close to the rail to make the lever slip along the rail. In this way the lever forms a walking thrust arm for an oscillating member.

It will be appreciated that the advance afforded the described embodiments of the apparatus is finite as is desirable when used with a drill. The rail need not be straight and can be curved to follow a non-linear line where this is desired. Furthermore, the housing can be provided by the drill casing.

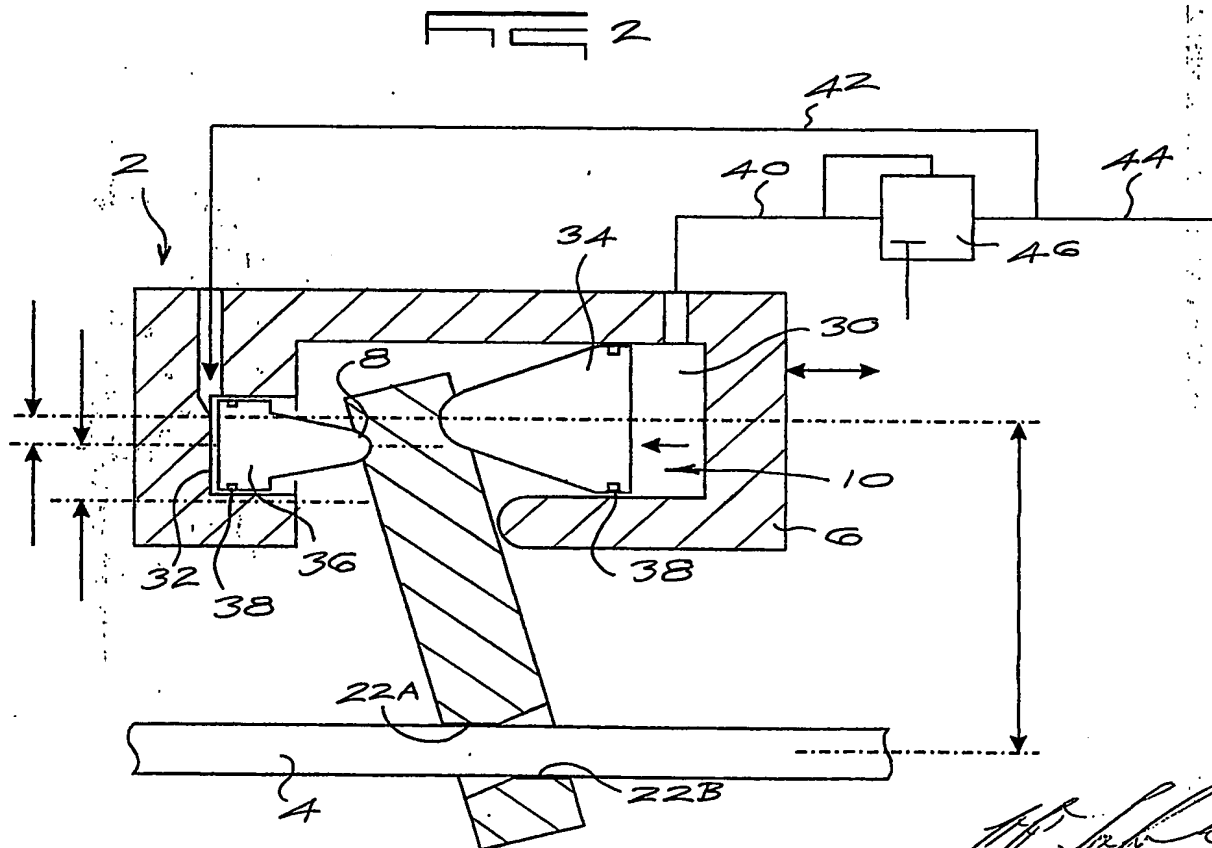
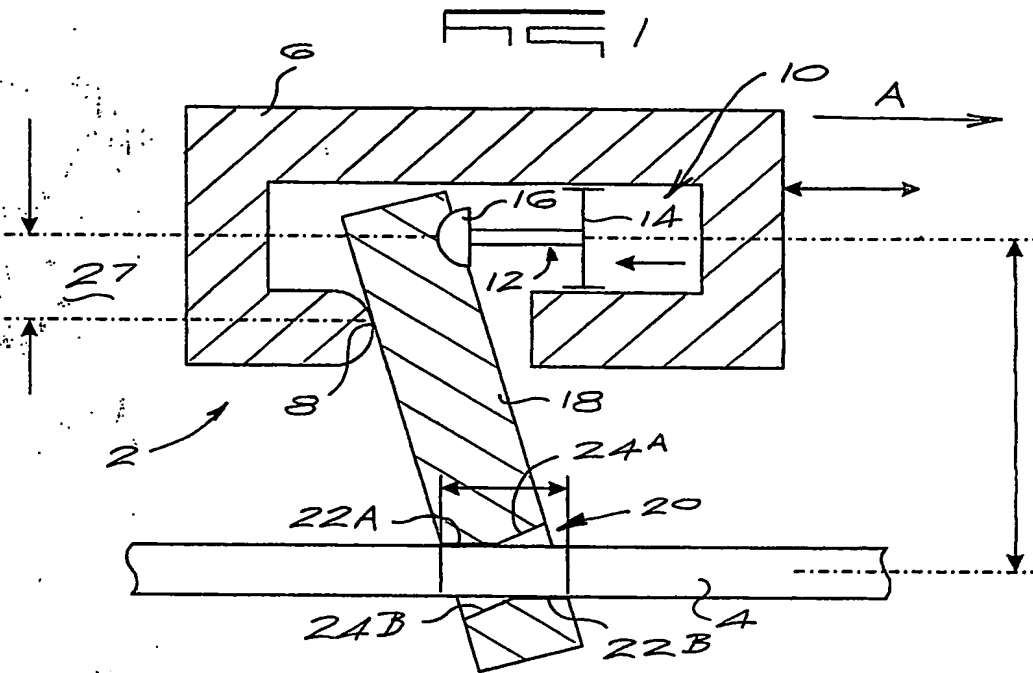
It will also be appreciated that the apparatus may be used to move a rail in relation to an oscillating member. Where a round rail is used with such an arrangement the apparatus can be used to impart rotary motion.

A person skilled in the art will appreciate that variations can be made to the embodiments described and that there are a number of alternative applications for which either the described or other embodiments may be used without avoiding the scope of the current invention.

DATED THIS 14TH DAY OF OCTOBER 2002



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FOR THE APPLICANT



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